

EXPLANATION OF PLATE XXXVIII.

- Fig. 1. *Limnothelphusa maculata*, gen. et sp. nov. (p. 698). Adult male, general view from above. $\times 2\frac{1}{2}$ about.
2. Ventral view of the anterior portion, to show the relations of buccal frame, epistome, antennules, and antennæ.
 3. Ventral view of posterior portion of thorax, abdomen removed, showing abdominal appendages and male genital papillæ.
 4. External maxilliped.
 5. Dactylus of walking-leg, to show the nature of the spinules.
 6. Terminal portion of cheliped, showing nature of dentation.
 7. Male abdomen, primitive dorsal view.

Figures 2-7 considerably enlarged.

Reference Letters.

a.g. Genital aperture.
f.b. Buccal frame.

ep. Epistome.
t.so. Sub-ocular tooth.

3. On two Species of Macrurous Crustaceans from Lake Tanganyika. By W. T. CALMAN, B.Sc., University College, Dundee.¹

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(Plates XXXIX. & XL.)

The Crustaceans collected in Lake Tanganyika by Mr. J. E. S. Moore and placed in my hands for examination comprise specimens of two species of Prawns, one forming the type of a new genus allied to *Caridina*, the other being a probably new species of *Palaemon*.

Sub-order MACRURA.

Tribe CARIDEA.

Family ATYIDÆ.

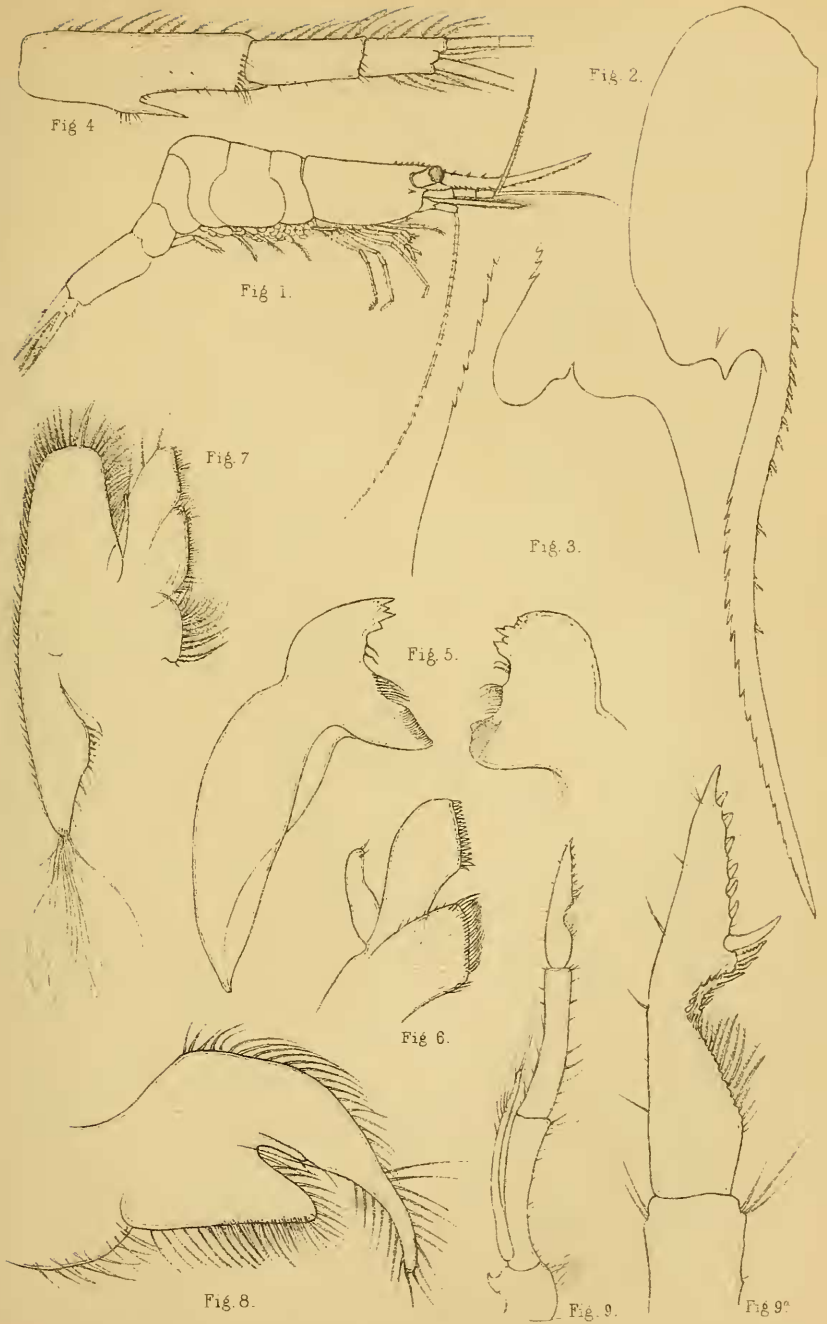
LIMNOCARIDINA, gen. nov.

Rostrum long, compressed, serrated. Carapace with a hepatic spine. Peræopods without exopods. Carpal joint of first pair slightly excavated distally, that of second pair not excavated. No epipods on any of the thoracic appendages. Gills four in number on each side, corresponding to the first four pairs of peræopods.

LIMNOCARIDINA TANGANYIKÆ, sp. n. (Plates XXXIX. & XL. figs. 1-2, 4-19).

Description.—The rostrum (Pl. XXXIX. figs. 1-2) is very long and slender, gently recurved, varying from about $1\frac{1}{3}$ to twice the length of the carapace, and extending beyond the antennal scale by $\frac{1}{3}$ to nearly $\frac{1}{2}$ its length. There are from 12-15 teeth on its

¹ Communicated by Prof. G. B. HOWES, F.Z.S.

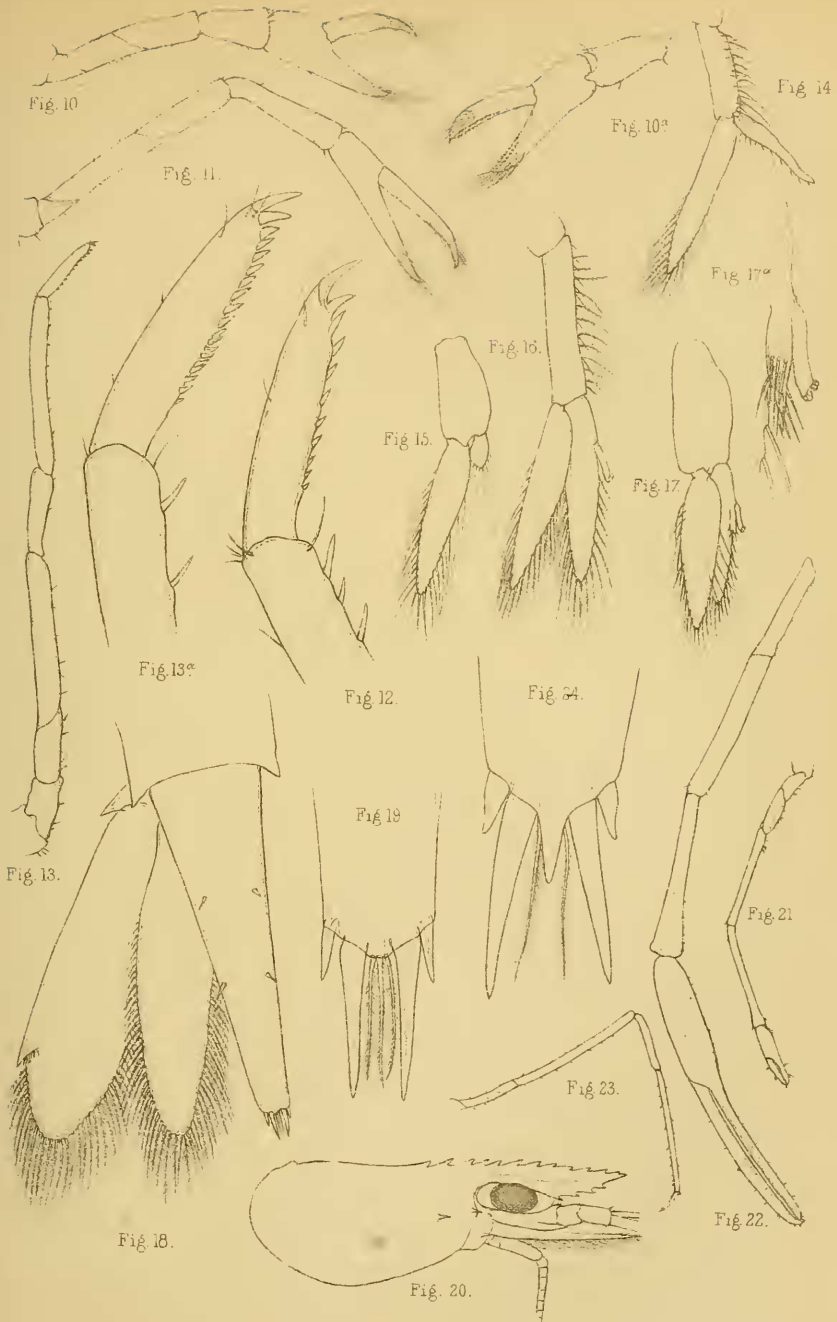


W. T. C. del.

J. T. Bennet Reid, Lith. Edin'

Figs. 1, 2, 4-9, LIMNOCARIDINA TANGANYIKÆ.

Fig. 3, CARIDINA WYCKII.



W. I. C. del.

J. T. Renne Reid, Lith. Edm^a.

Figs. 10-19, LIMNOCARIDINA TANGANYIKÆ.
Figs. 20-24, PALÆMON MOOREI.

upper edge, three (rarely two) of which are behind the orbit. The teeth become more widely spaced distally, and the last one is generally separated by rather less than half the length of the rostrum from the simple, sharply pointed tip. The lower margin of the rostrum bears from 10-20 teeth, which extend quite to the tip. Below the orbit the anterior margin of the carapace is produced into a triangular tooth, but there is no "antennal" spine such as is present in most species of *Caridina*, e.g. in *C. wyckii* (Pl. XXXIX. fig. 3.). A little way back on the side of the carapace, and below the level of the sub-orbital tooth, there is a well-marked "hepatic" spine. The lower anterior corner of the carapace is evenly rounded, and there is no pterygostomial spine.

The peduncle of the antennules (Pl. XXXIX. fig. 4) falls short of the distal tooth on the outer margin of the antennal scale. The first joint is about equal in length to the two succeeding joints together. The basal spine is small and slender, its tip falling short of the distal end of the joint by $\frac{1}{4}$ the length of the joint. The short spine on the distal end of the first joint reaches to about $\frac{1}{4}$ the length of the succeeding joint. The ocular peduncle is rather shorter than the first joint of the peduncle of the antennule.

The mandibles (Pl. XXXIX. fig. 5) are somewhat dissimilar on the two sides. The cutting-edge is separated from the molar process by a shallow emargination, within which are set two stout setæ (in *C. wyckii* there is a row of about ten), followed at a little distance by a thick brush of finer setæ just in front of the molar process.

The first maxillæ (Pl. XXXIX. fig. 6) differ from those of *Caridina*, and such allied genera as *Atya* and *Atyaephyra*, in the smaller size of the two inner lobes, the inner edges of which are much shorter, while the lobe which in these genera represents the exopod is here absent.

The second maxillæ (Pl. XXXIX. fig. 7) also depart somewhat from the type characteristic of the *Atyidae*. In the other members of the family the middle lobe of the endognath (the proximal division of the *lacinia externa* in Boas's nomenclature) is very much expanded, overlapping both the other lobes and presenting a very long, straight, inner edge. In the present form this lobe is much smaller, its inner edge being hardly longer than that of the distal lobe, which it does not overlap. The proximal lobe, as in the other *Atyidae*, is large and is overlapped for a short distance by the middle lobe. The scaphognathite is truncated anteriorly and produced to a point posteriorly, where it bears, as usual in this family, a tuft of very long slender setæ, hooked at the tip but not presenting the curious swelling and tooth near the base which characterize these setæ in *C. wyckii*.

In the first maxilliped (Pl. XXXIX. fig. 8) the exopod tapers gradually from the base with hardly an indication of the external lobe (marked *a* by Boas) present in *Caridina* as in most *Eukyphota*. The epipod, rudimentary in *Caridina*, seems to be quite absent.

The third maxillipeds (Pl. XXXIX. fig. 9) extend forward as

far as the end of the first joint of the peduncle of the antennules. There is on the outer surface of the coxal joint a conical curved papilla similar to, but smaller than, the papilla to which the epipod of this appendage, here absent, is attached in *C. wyckii*. The exopod exceeds in length the joint from which it springs. The terminal joint is shorter than the penultimate joint, and presents a remarkable structure (fig. 9*a*). About the middle of its length there is a deep excavation of the inner side, a little beyond which distally stands a stout curved spine; a double row of strong toothed spines smaller than the preceding and gradually diminishing in size, fringe the distal margin of the notch; the oblique posterior or proximal margin is fringed with feathered or pectinate setæ. Beyond the notch, the inner margin of the joint bears a series of 6-7 short spines leading up to the pointed apex of the limb. I am not aware that an arrangement similar to this is found in other *Atyidae*. In *C. wyckii* there is only a very slight concavity of the inner margin of the joint, clothed with numerous spines and setæ.

The first pair of peræopods (Pl. XL. figs. 10, 10*a*) do not reach to the terminal joint of the third maxillipeds. The ischium and merus are short and subequal. The carpus is conical in shape, rather more than one-half as broad as long, about equal in length to the merus, and slightly longer than the palmar portion of the hand; it is slightly excavated distally on the inner side (fig. 10*a*). The hand is long and narrow, the breadth being about one-third of the length. The fingers are slender, longer than the palm, spoon-shaped, but acutely pointed as seen from the side, instead of truncate as in *C. wyckii*. The opposed margins bear series of small stout spinules increasing in size towards the tip, but there is no strong terminal hook as in *C. wyckii*. The brushes of setæ borne by the fingers are very scanty compared with those of *C. wyckii*.

The second peræopods (Pl. XL. fig. 11) reach forward as far as the tip of the third maxillipeds. The ischium is a little longer than the merus and about equal to the carpus. The latter is cylindrical and only slightly wider distally. The hand is longer than the carpus by one-third the length of the latter, and its breadth is less than one-quarter of its length. The fingers are very long and slender, about twice as long as the palm, sharply pointed, and with scanty terminal brushes.

The third pair of peræopods extend beyond the third maxillipeds when turned forward, and the last pair fall short of them. The dactylus is one-third to two-fifths the length of the propodus. The dactylus of the last pair (Pl. XL. fig. 13*a*) is similar to the preceding two pairs, having only a slightly larger number of spines on its inner margin, the numbers being from 11 to 15 in the case of the third and fourth peræopods, and from 16 to 19 in the last pair. In *Caridina* the dactylus of the last peræopods is longer and bears a much more numerous series of spines than do those of the preceding two pairs. In a specimen of *C. wyckii*, for example, the dactyli of the third and fourth pairs bore 7 and 8 spines

respectively, while the dactylus of the fifth pair was half as long again and had a row of 39 spines.

In the female, the first pair of pleopods (Pl. XL. fig. 14) have the endopod rather slender, pointed, and more than half the length of the exopod. In the male (Pl. XL. fig. 15), the endopod is a short ovate leaflet about one-quarter the length of the exopod. In nearly all the specimens of both sexes the first pair of pleopods are turned forward, with the exopod lying above and external to the bases of the posterior peræopods. According to F. Müller (Kosmos, ix. 1881, p. 121), this is the position taken by these appendages in the living *Atyoida*, and he states that they serve to protect the entrance to the branchial chamber, the fringe of marginal setæ acting as a sieve to exclude mud, &c.

In the second pleopods of the male (Pl. XL. figs. 17, 17a), the *appendix masculina* is a little shorter than the *appendix interna*, and bears a number of stout spines.

The telson (Pl. XL. fig. 18), is about as long as the inner plates of the uropods, with straight sides, tapering to the obtusely pointed tip which bears four spines, two short external and two longer internal, between which latter spring three plumose setæ. On the dorsal surface of the telson are two pairs of spinules. In *C. wyckii* the tip of the telson bears eight spines, and the dorsal surface three pairs of spinules.

The gills are four in number on either side, three pleurobranchs, corresponding to the second, third, and fourth peræopods, and one which I believe to be a pleurobranch (though it is difficult to determine the precise point of insertion) above the first peræopod. There are no epipods on the maxillipeds or peræopods, unless we regard as a rudimentary epipod the small papilla at the base of the third maxilliped described above. In tabular form the arrangement is:—

	mxp. ²	mxp. ³	per. ¹	per. ²	per. ³	per. ⁴	per. ⁵	
Pleurobranchiæ...	—	—	1	1	1	1	—	4
Podobranchiæ ...	—	—	—	—	—	—	—	—
Arthrobranchiæ...	—	—	—	—	—	—	—	—
Total	4

The statements of various authors as to the branchial formulæ of the genera of *Atyidae* are somewhat conflicting, but all agree in giving a larger number of gills and a complete series of epipods as far as the fourth peræopods.*

* F. Müller states (*l. c.* p. 121) that in *Atyoida potimirim* the last two pairs of legs are without epipods.

In *C. wyckii** and *C. typus* I find the following arrangement:—

	mxp. ²	mxp. ³	per ¹ .	per. ²	per. ³	per. ⁴	per. ⁵
Pleurobranchiæ.....	—	—	1	1	1	1	1
Arthrobranchiæ.....	—	2	1	—	—	—	—
Podobranchiæ	1	ep.	ep.	ep.	ep.	ep.	—

This agrees with the formula for *Atya*. Claus states that *Troglocaris* lacks the arthrobranch of the first peræopod. According to Boas, *Atyaëphyra desmarestii* has no arthrobranch on the first peræopod, and only one on the third maxilliped.

The males are usually somewhat smaller than the females, and have as usual the pleural plates of the abdomen less deep. In the female the two flagella of the antennule are of about equal length, and about twice as long as the peduncle, the outer flagellum being slightly thickened for about two-thirds of its length. In the male both flagella are much elongated, the outer being longer than the inner, and in uninjured specimens measuring more than four times the length of the peduncle, or about one-half the length of the body. The thickened basal part is more distinct than in the female. I have not observed any sexual differences in the armature of the walking-legs or of the maxillipeds, nor in the shape of the anterior margin of the carapace, such as are described by Müller in *Atyoidea*.

The eggs carried by the females are ovoid in form, measuring about $\cdot 18 \times \cdot 27$ mm.

Total length of largest specimen (♀), 23 mm.

Many specimens of this form were collected in shallow water.

Comparing the new form with the other genera of *Atyidae* as revised by Ortmann (Proc. Acad. Nat. Sc. Philad. 1894, p. 397), we find that (like all the other higher *Atyidae*) it differs from *Xiphocaris*, *Troglocaris*, and *Atyaëphyra* in the absence of exopods from all the peræopods. It resembles *Caridina* and differs from *Atya* and *Atyoidea* in the fact that the carpus of the second peræopods

* The formula given by Hickson is incomplete (Ann. Mag. Nat. Hist. (6) ii. 1888, p. 361). Although the number of the epipods (mastigobranchiæ) is given correctly, these organs appear to have escaped his notice, for he figures as "mastigobranchiæ" the long coxal setæ of the peræopods. The true epipods are of a shape similar to those of many other *Caridea*, and like those figured by Joly in *Atyaëphyra* and by Müller in *Atyoidea*, consisting of a short curved stem directed backward and terminated by a strong hook which grasps firmly the coxal setæ of the next succeeding peræopod.

† It is possible that one of these should be regarded as a pleurobranch. In *Atya* the corresponding gills are certainly arthrobranchs, as stated by Pocock (A. M. N. H. (6) iii. 1889, p. 15). Claus, who does not attach much morphological importance to the place of insertion, assigns these two gills to his series *b* & *c* respectively (Neue Beitr. z. Morph. d. Crust., Arb. Zool. Inst. Wien, vi. 1884, p. 57).